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December 30, 1993

Mr. William Caton, Acting Secretary
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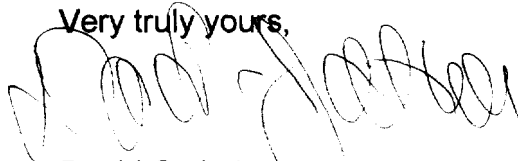
In re: GEN Docket No. 90-314
Opposition to Petitions for Reconsideration
The Ericsson Corporation

Dear Mr. Caton:

Pursuant to the provisions of Section 1.429 of the Commission's rules, transmitted herewith on behalf of The Ericsson Corporation is an original and eleven copies of its "Opposition to Petitions for Reconsideration" for filing in the above-referenced proceeding.

Should there be any questions with regard to this matter, kindly communicate directly with the undersigned.

Very truly yours,



David C. Jatlow
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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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In the Matter of)	
)	
Amendment of the Commission's)	Gen Docket No. 90-314
Rules to Establish New)	RM-7140, RM-7175, RM-7168
Personal Communications)	
Services)	
)	

To: The Commission

**Opposition of The Ericsson Corporation to
Petitions for Reconsideration**

The Ericsson Corporation ("Ericsson") by its attorney and pursuant to the provisions of Section 1.429 of the Commission's rules, hereby submits its opposition to petitions for reconsideration filed with respect to the *Second Report and Order* in Gen Docket No. 90-314.¹

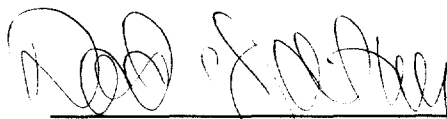
Ericsson's opposition is limited to issues raised with respect to unlicensed PCS issues and consists of a Technical Appendix which is attached hereto and made a part hereof. As in its Petition for Reconsideration, as well as the various pleadings filed in this Docket, Ericsson believes that Subpart D of Part 15 of the Commission's rules should encourage the most efficient use of limited spectrum and provide for the deployment

¹ *Second Report and Order* in GEN Docket No. 90-314, Amendment of the Commission's Rules to Establish New Personal Communications Services, FCC 93-451, 8 FCC Rcd 7770 (adopted September 23, 1993, released October 22, 1993).

of a wide variety of existing and future unlicensed PCS technologies. Indeed, Ericsson believes that there should be no Commission rules which artificially or arbitrarily preclude the implementation of any technology in the unlicensed PCS band since that will only serve to deprive consumers of competitive choices. Thus, the issues on which reconsideration were originally sought as well as the arguments made in the attached Technical Appendix, seek to enhance the existing unlicensed PCS rules to allow consumers to have competitive choices.

Respectfully submitted,

The Ericsson Corporation

A handwritten signature in dark ink, appearing to read "David C. Jatlow", is written over a horizontal line.

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**Technical Appendix
Opposition To Petitions For Reconsideration
Second Report & Order on PCS**

1. General

We are at the final stage of adjusting to a world unique set of coexistence rules which will provide reliable coexistence of uncoordinated system installations using a common spectrum resource. The coexistence rules are designed to allow significant freedom in selection of technology and setting of system parameters, and provide a unique possibility of gaining real life experience of sharing a frequency resource by decentralized automatic selection of radio communication channels. (The experience gained by using these rules in the near future may provide knowledge on how to design reliable coexistence rules for certain classes of licensed operations on a future common licensed frequency band.)

At least 13 companies have commented on the unlicensed PCS rules adopted by the FCC. At some stage the refinement must come to an end. Some refinements can only be sensibly made after experience of applying the rules. There may also be a need to clarify the rules in the future as to specific technologies such as, for example, channel access for DS-CDMA devices, as will be discussed in paragraph 2.9 below. Ericsson supposes that the FCC will have a readiness for smooth introduction for clarifications or fixes that may become obvious from the increased experience of applying the rules.

This technical appendix deals primarily with the isochronous sub-band and the rules relating thereto.

A suggested change can not be regarded in isolation, but must be judged in light of the essential overall goals for the rule making.

Below are a few *Guide Lines* Ericsson believes are important and relate to the essential goals of a spectrum etiquette:

A. *The rules should, within the limits of the essential goals, rather allow more freedom than less freedom or else valuable experience using this concept could be unnecessarily missed.* For instance, any segmentation (channelization) will favor narrowband manufacturers in the market place. Removing it will not be unfair to anybody. See 2.1.

B. *The best coexistence and escape possibilities (escapes from interference from microwave links, licensed and unlicensed devices, for example) is provided by having the largest possible continuous frequency band, accessible for any technology.* Thus, it is much better to have a contiguous 20 MHz isochronous band, than two separate 10 MHz isochronous bands. Likewise, it is much better to have the same set of rules than different rules that prevent access to all 20 MHz.

C. *Any rule that conserves the idea of ownership of spectrum is in conflict with the very basis for the listen-before-talk-based coexistence on a common spectrum resource.* Thus, control signalling or marker transmissions must also be subject to guideline D.

D. *Reliable coexistence is based on (1) monitor before transmit and (2) that transmissions immediately stop when the communication is finished or if the access channel is not good enough (no acknowledgement).* These basic principles must not

be indirectly bypassed by any rule.

E. Reliable coexistence is also based on a high probability that a device, when interfered, can find another, better access channel on which to escape. This is only possible if a device or a group of fixed collocated devices, is prevented from occupying all of the available spectrum.

2. Specific Issues

2.1 Removal Of Channelization (Segmentation)

Motorola argues for 1.25 MHz channelization of the entire isochronous spectrum. Motorola also writes that channelization represents the WINTech view and allows CDMA. Neither is accurate! A CDMA/TDD transmission will likely require at least 2.5 MHz¹, in order not to restrict the choice of implementation parameters. The repeated statements by Motorola and WINForum that their etiquette reflects an industry consensus is true in one sense, but definitely not regarding the channelization. Apple, Ericsson, Luce, Rockwell, Omnipoint, Rolm and SpectraLink have all submitted pleadings requesting the removal of segmentation.²

¹ A state of the art DS-SSMA FDD system uses two 1.25 MHz channels for a duplex connection using 8 kbps speech code technology. Thus, 2.5 MHz will be required for a TDD duplex connection.

² Numerous companies who have actively participated in WINForum and generally in GEN Docket No. 90-314 favor the complete removal of isochronous band segmentation because of the negative ramifications for pre-deployment, deployment and post-deployment of isochronous devices. See, for example, Comments of SpectraLink Corporation on Apple Computer's Emergency Petition (November 8, 1993); Comments of Omnipoint Corporation on the WINForum Etiquette (August 28, 1993); Supplemental Comments of Telocator on the WINForum Etiquette (July 20, 1993); Comments of Apple Computer, Inc. (November 8, 1993) and Ex Parte presentation of Ericsson, LACE, Rockwell, Rolm and SpectraLink (September 13, 1993).

The concept of channelization remains from the traditional concept of "ownership" being the foundation for fixed frequency allocations. During the last 6 months there has been a growing awareness in industry that any rule that conserves the idea of ownership is in conflict with the underlying premise of a listen-before-talk-based coexistence using a common spectrum resource.

The necessary basis for reliable and effective coexistence is provided by the listen-before-talk threshold rules, the maximized transmitter bandwidth, the maximized spectrum occupancy of a group of fixed collocated devices and the frame cycle time rules. Fixed channelization is understood not to contribute to any of the basic etiquette goals. Rather, it prevents them. Fixed channelization only insulates narrowband techniques from fair competition from state of the art more wideband technologies by limiting their bandwidth and preventing optimized carrier positions. For example, systems with transmission bandwidth larger than half the channelization bandwidth could waste 25-50% of the spectrum since the channelization prevents effective packing.

Thus, at the latest WINTech meeting 11/15-11/16, 1993 and the Telocator T&E meeting on 11/29-12/2, 1993 the majority voted for including a requirement to remove channelization in comments to the FCC. This was however blocked by the minority. Removal of the artificial segmentation is essential and is supported by a large number of manufacturers. There are only winners. The removal of the segmentation will not be unfair to any manufacturer. Relevant Guide Lines for removal are A, B and C. Further arguments for removal are found in Ericsson's Petition for Reconsideration filed

December 8, 1993.

2.2 Control And Signalling Information, Marker Transmission

WINForum and other companies have requested the FCC to allow unacknowledged control and signalling information for 30 seconds and a modification of the text of Section 15.321(c)(4) has been suggested. The main argument is that effective sleep mode of terminals may require more than 1 second wake up time and marker transmissions need to be longer.

It is, however, important to differentiate between the need for marker transmissions and the general control signalling on the selected duplex channel at set-up. The rule must be written so that Guide Line D is not bypassed.

To ensure that Guide Line D is not bypassed by the provisions for control signalling, the Ericsson submission on December 8, 1993 (Appendix I, Section 11) suggested an addition to Section 15.319(f): "...as long as every transmission complies with the rules as specified for channel access in Section 15.321." Ericsson also requested that continuous acknowledgements every 10 seconds shall be added to Section 15.321(c)(4). If those additions are not made a situation could arise where after an acknowledgement within 1 second control signals could be transmitted continuously for 8 hours, blocking others from access. Motorola has a similar comment.

Signalling at set-up on a selected duplex channel for 30 seconds without acknowledgement cannot be accepted. It violates Guide Line D in that transmissions must stop if the channel is not useable (in order to respect the other existing

transmission that caused that the channel was not usable). It would also for every call set up by-pass the basic rule that transmission must stop within 1 second if no acknowledgement has been received.

Suitable access time (and sleep time) should be in the order of 1 second for telephone calls. Therefore, acknowledgement within 1 second is reasonable.

For marker transmissions a more or less continuous transmission is required. Here a 30 second limit is suitable. If long sleep times are necessary, then the marker transmission channel can be used for this purpose.

In order not to create a general by-pass to basic coexistence behavior, it is necessary to differentiate requirements for marker transmissions from the requirements for signalling on intended traffic channels which must obey the normal rules.

Therefore we suggest the reinstatement of a modified marker transmission definition from the WINForum Etiquette Version 16:

A marker transmission is a low capacity unacknowledged one-way transmission used by a device to identify itself to other interoperable devices within its communication range. The content and purpose of marker transmissions shall be limited to minimal control and signalling information as needed by a device to establish or maintain communications with other inter-operable devices. The total time/spectrum window occupied by marker transmission on fixed collocated devices must not exceed the time/spectrum window size occupied by a normal speech transmission. The marker transmissions are subject to the duplex channel access rules of 15.321 except for (c)(4). The maximum duration of marker transmission shall be 30 seconds. Thereafter the channel access criteria have to be repeated for continuing the marker transmission.

Note: The reason for using the duplex channel access criteria is the following:

Before starting such long marker transmissions it is obvious that the intended time/spectrum transmit window always must have been monitored. However, a marker transmission is intended to be heard everywhere within a cell and can by its nature not be acknowledged or suggested to move somewhere else by every mobile within a cell. Therefore it is very important to select a very good transmit window for a marker. The probability of selecting a best transmit window increases if the corresponding receive window is also monitored because energy on the receive window normally indicates that the corresponding transmit window is used in the vicinity.

2.3 Support Of Duplex Operation

Several companies suggest a good text for solution. Ericsson however prefers the text for Section 15.321(c)(1) provided in its December 8, 1993 petition for reconsideration. This text uses the concept of addressed device which is essential.

2.4 Emission Limits Outside The Sub-Band And Sub-Channel Edges

For Sections 15.321(d) and 15.323(d) WINForum and other companies suggested changing the 40 dB limit to 30 dB and changing Emissions to Total Emissions. Ericsson agrees.

But, since Ericsson does not agree to fixed channelization, the term "channel" in these sections should be changed to "sub-bands" (isochronous and asynchronous).

Also, Ericsson does not agree to measuring the 60 dB limit (for frequencies beyond 2.5 MHz outside the sub-bands) in a bandwidth equal to the transmission bandwidth. This limit should be measured in a 1.25 MHz bandwidth. If not, a 100 kHz transmitter would be allowed to emit 10 dB more in any 1.25 MHz band than a 1 MHz

transmitter.

Ericsson can not agree to Apple Computer's suggestion to decrease the 60 dB attenuation value to 50 dB. Since these 60 dB in Sections 15.321(d) and 15.323(d) provide the bottom line for any escape possibility, if anything the Commission should instead somewhat increase this attenuation value.

2.5 Power Measurement

In its petition for reconsideration Ericsson submitted recommendations to improve Section 15.303(f). In addition, WINForum and some companies have suggested to change Section 15.319(c) to allow an envelope peak 10 dB above the defined maximum power limits. WINForum made a mistake in including this suggestion since this was not decided at the last WINTech meeting. Ericsson can not support this suggestion since it has not been demonstrated that a number as large as 10 dB will not cause interference beyond what was intended by the defined power limits.

2.6 Accuracy of Threshold Limits

Several petitions for reconsideration recognize the problem with the ± 3 dB limit in Section 15.321(c)(8). WINForum and others suggests an increased tolerance.

Ericsson and Motorola suggests a one-sided requirement, which is the correct solution. The text suggested by Ericsson also makes clear for which sections rule 15.321(c)(8) is relevant. E.g. Section 15.321(c)(5) is not relevant.

2.7 Access Of 40 Duplex Channels In Section 15.321(c)(5)

AT&T suggests to change "...must have monitored all access channels" to "...must have monitored at least 40 access channels."

Ericsson agrees but there are additional reasons why not all channels can be monitored, e.g. partial local barring of the spectrum due to microwave links.

Ericsson therefore suggests the following text: "...must have monitored at least 40 access channels, or less if 40 are not available, within the last 10 ms."

Ericsson also requests that in the third line of Section 15.321(c)(5), the words "defined for a system" are changed to "defined for a device." This is essential to fulfill the intention of this important section. Furthermore, to try to define "a system" would lead to a large needless effort, since all rules relate to devices.

2.8 The LBT Threshold KTB + 50 dB, Section 15.321(c)

SpectraLink has recognized a potential problem with a too low threshold of Section 15.321(c). Ericsson recognizes that there could be room for optimization and has the following comments:

Firstly, whether a typical interference level is higher or lower than the threshold depends on the propagation model used and how the calculations are made. Different scenarios will give different results.

Secondly, it is not true that set up is impossible if the threshold $\text{KTB} + 50 \text{ dB} = -64 \text{ dB}$ is superseded by the interference levels from the first tier of a thought fixed 7 cell reuse pattern. The reason is that the LBT rules do not use any fixed reuse pattern (they prevent the use of fixed reuse). The result of high interference levels from own transmissions will be that set ups are possible, but on average with less possible simultaneous calls per cell, corresponding to a larger equivalent reuse factor e.g. 15 or 20 and correspondingly larger number of base stations.

Ericsson has however made simulations with the loss factor = 0 dB and B = 40 and 20. This shows that a threshold of KTB + 50 dB is reasonable for B = 40. But for B = 20 (large open office) the traffic is increased by 50% if the threshold is increased from KTB + 50 dB to KTB + 65 dB. This proves the concern of SpectraLink.

Therefore, if an optimization is desired, Ericsson requests that the threshold KTB + 50 dB is increased by 10-15 dB.

It is not acceptable to allow a general by-pass of the defined monitoring requirements when own generated interference is recognized, as AT&T plainly suggests. It would allow direct set up on a time/spectrum window to a device in an area where that time/spectrum window never was monitored. It could result in not intended uncontrolled interference to the own system as well as to adjacent other devices.

2.9 Special Provision For DS-CDMA Devices

The statements in paragraph 1.8 are relevant for FDMA and TDMA systems.

However DS-CDMA base stations provide multiple access on the principle that a new call set up is made on the same transmit and receive time spectrum window already in use for other calls by that base. Therefore e.g. a DS-CDMA mobile must be allowed to, and perhaps even forced to, make a set up on time/spectrum windows decoded as already being in use by the wanted base station. Therefore Ericsson requests a clarification on how to interpret the monitoring rules for a DS-CDMA device.

2.10 Removal Of The Packing Rules, Section 15.321(b)

WINForum and several companies state that the present old WINForum packing rule is counter productive and suggest it be removed completely. Ericsson agrees that

the present packing rule is counter productive. WINForum is however incorrect in its footnote 4 where it states that a common search pattern precludes efficient pico cellular channel allocation. The order of searching does not overrule the requirement to use a free or a least interfered channel.

Ericsson and Rockwell have presented attempts for an improved rule. Wideband and narrowband devices do their packing in different directions. The starting area is wide and not immediately at the sub-band edges. (The statement by Northern Telecom that packing rules generally will cause service degradation due to the high probability of collision at call set up, is not correct. On the contrary, there is a very low probability that two voice calls are set up during the same 10 ms interval on the same access channel. The last paragraph of the Ericsson text is very important because the whole sub-band is not always accessible. The rules can easily be modified for a contiguous 20 MHz isochronous sub-band.

A packing rule must not force devices to use the first acceptable channel (time/spectrum window), but devices will normally choose the first available channel, and thus spreading over the whole sub-band is normally avoided. Narrowband and wideband devices will normally use different parts of the spectrum for increased traffic due to the opposite search directions.

Ericsson also supports the Rockwell request that the total (sum of) spectrum occupied by a device shall be limited to 50% of each isochronous 10 MHz sub-band. A limitation of this kind is required in conjunction with a packing rule. This prevents one device from blocking the entire spectrum, but does not significantly limit the freedom for

escapes to another part of the spectrum if, occasionally, needed. See Guide Line E. Since a contiguous 20 MHz spectrum is more efficient than two separate 10 MHz blocks, the percentage can be decreased from 50 to 35%, without significantly decreasing the performance of a base station. If the FCC adopts the contiguous 20 MHz isochronous sub-band proposal of Apple Computer, the last sentence of Section 15.321(c)(5) should be replaced with the following sentence:

No device or group of fixed co-operating devices located within 1 meter of each other shall occupy a total of more than 35% of the 20 MHz isochronous sub-band during a 10 ms frame.

2.11 Multicarrier/Shared Antenna Devices

Northern Telecom has suggested a new Section 15.321(c)(11) that for Multicarrier/Shared Antenna Devices by-passes the normal LBT rules.

Since different systems have different time relations between receive and transmit windows, it is of course impossible to generally state, as Northern Telecom does, that if a receive window of a device of a given system is free then that system or device will not interfere with another system's device on the corresponding transmit window. This suggestion is even more unacceptable in combination with its request to allow 30 seconds unacknowledged signalling at call set up. This would allow a 30 second transmission at every call set up from a base station on a time/spectrum window that has not been monitored at all. This would effectively terminate any connection that happens to be interfered during this long unacknowledged transmission.

2.12 Other Items

Ericsson feels AT&T exaggerates the testing problems. Many of the suggested procedure tests could be exchanged for a manufacturers declaration, supported by relevant design documentation to the extent required by the FCC.

CERTIFICATE OF SERVICE

I, Lisa M. Volpe, hereby certify that on this 30th day of December 1993, copies of the foregoing Opposition to Petitions for Reconsideration were sent by postage-paid first class mail to the following:

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